



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Ingegneria
ACADEMIC YEAR	2022/2023
BACHELOR'S DEGREE (BSC)	CHEMICAL AND BIOCHEMICAL ENGINEERING
SUBJECT	PHYSICS II
TYPE OF EDUCATIONAL ACTIVITY	A
AMBIT	50293-Fisica e chimica
CODE	07870
SCIENTIFIC SECTOR(S)	FIS/01
HEAD PROFESSOR(S)	DE GIOVANNINI UMBERTO Ricercatore a tempo determinato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	96
COURSE ACTIVITY (Hrs)	54
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	1° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	DE GIOVANNINI UMBERTO Tuesday 14:30 15:30 In persona: Dipartimento di Fisica e Chimica, stanza 122, Via Archirafi 36 Online: piattaforma Teams

PREREQUISITES	The students should be familiar with basic concepts of classical mechanics and with appropriate mathematical tools. In particular, the students must know and understand such concepts as force, work made by a force and energy. Moreover, it is important to have mathematical skills in the following purviews: vector calculus (sum, difference, scalar product, vector product, components, unit vectors), differential calculus (derivative of simple functions), integral calculus (general concept, integrals of polynomials and basic trigonometric functions)
LEARNING OUTCOMES	Knowledge and understanding: Acquisition of a structured knowledge of the fundamental laws of the classical theory of electromagnetism and optics and ability to correctly interpret the mathematical equations that describe them. Applying knowledge and understanding: Acquisition of ability to describe electromagnetic phenomena, schematize them and correctly applying the fundamental laws. Making Judgements: Acquisition of ability to recognize and classify physical processes, to choose autonomously the way to solve physical problems, and the laws to apply. In order to achieve this, students will have to interact both with other students and the teacher by presenting and discussing calculation strategies. Communication skills: Acquisition of ability of exposing clearly and synthetically the fundamental laws of the classical theory of electromagnetism also connecting them with topics external to the course. In order to achieve this students are actively involved in solving particular physical problems. Learning skills: at the end of the course students will acquire a method for the study of physical processes that can be useful in further applications and in-depth studies. Such skills will be developed in particular through classroom exercises aimed at getting the students acquire strategies for solving physical problems on the basis of the acquired theoretical knowledge.
ASSESSMENT METHODS	The final examination consists of a written test and a discussion, the latter taking place only if the candidate passes the written test. The written test, lasting 3 hours, consists in solving two problems regarding electrostatics and electromagnetism. The written test aims at verifying both the candidate's knowledge of the physical laws studied and his ability to apply those laws to new physical situations. In addition the test aims to evaluate the candidate's ability to analyze a physical phenomenon and to obtain a result by adopting an efficient calculation strategy. The discussion covers the explanation of physical laws and their use in solving simple problems; besides verifying the candidate's knowledge, the discussion allows the evaluation of his ability of using a clear, thus appropriate, language. The overall evaluation will be as follows: -Insufficient (exam not passed) if the candidate does not show an acceptable knowledge of the contents of the course. - Sufficient (mark 18-20) if the candidate shows a sufficient knowledge of the contents of the course but a limited ability of both exposition of the concepts and application of the methods. - Satisfactory (mark 21-23) if the candidate exhibits sufficient knowledge of the contents, sufficient ability of exposition of the concepts and sufficient ability of application of the methods. - Good (mark 24-26) if the candidate exhibits good knowledge of the contents, sufficient ability of exposition and sufficient ability to apply the methods. -Very good (27-29) if the candidate exhibits good knowledge of the contents, good ability of exposition, and fairly good ability of application of the methods. -Excellent (mark 30-30 cum laude) if the candidate exhibits excellent knowledge of the concepts, excellent ability of exposition and the ability to apply autonomously the methods.
EDUCATIONAL OBJECTIVES	Adequate knowledge of the methodological aspects of the topics of the course and the ability to use that knowledge to interpret, describe and solve problems in the context of electromagnetism.
TEACHING METHODS	The teaching is organized in lectures and practical hands-on classes.
SUGGESTED BIBLIOGRAPHY	- P. Mazzoldi, M. Nigro, C. Voci, Elementi di Fisica, Elettromagnetismo e onde, Casa Ed. Edises, II edizione -Halliday, Resnick, Krane, Fisica 2, casa editrice Ambrosiana

SYLLABUS

Hrs	Frontal teaching
10	Coulomb's law; Electrostatic field; Gauss' law; Electric potential; Energy of the electric field; Electric dipole; Electric fields generated by electric charge distributions; Properties of conductors at the equilibrium. Electric capacity; Insulators
2	Electric current. Electric resistance and Ohm's law. Circuits with direct current.
10	Magnetism: magnetic field; Lorentz's force; magnetic dipole; Laplace's elementary laws; law of Biot-Savart; Ampère's law; magnetic fields produced by currents; induced electromotive force and Faraday's law; Energy of the magnetic field.
2	Maxwell's equations: complete form and displacement current; general properties; differential form.
6	Electromagnetic waves. Poynting's vector. Polarization. Snell's law.
Hrs	Practice
10	Electrostatics: electrostatic fields generated by assigned electric charge distributions; electric fields in presence of conductors and insulators
4	Circuits with direct current.
10	Magnetic fields generated by currents; electromotive forces induced by magnetic fields; circuits with moving parts in presence of magnetic fields; mutual and self inductance.